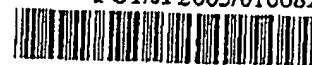


Translation

PATENT COOPERATION TREATY

PCT/JP2003/016682



PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

| | | |
|---|--|--|
| Applicant's or agent's file reference POKJ-10375 | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/JP2003/016682 | International filing date (day/month/year) 25 December 2003 (25.12.2003) | Priority date (day/month/year) 26 December 2002 (26.12.2002) |
| International Patent Classification (IPC) or national classification and IPC C07H 15/26, C08B 37/00, G01N 30/48 | | |
| Applicant KAJIHARA, Yasuhiro | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 11 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- ☒ Box No. I Basis of the report
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

| | |
|--|---|
| Date of submission of the demand 11 June 2004 (11.06.2004) | Date of completion of this report 26 November 2004 (26.11.2004) |
| Name and mailing address of the IPEA/JP | Authorized officer |
| Facsimile No. | Telephone No. |

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language _____, which is language of a translation furnished for the purpose of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ The international application as originally filed/furnished
- ☐ the description:
- pages _____, as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the claims:
- pages _____, as originally filed/furnished
- pages* _____, as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the drawings:
- pages _____, as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

See supplemental sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

- ☒ all parts.
- ☐ the parts relating to claims Nos. _____

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: IV. 3.

Claims 1 to 4 describe an invention relating to sugar-chain asparagine derivatives represented by the general formula (1); claims 5-10 describe an invention relating to sugar-chain asparagine derivatives wherein at least one fucose molecule is bonded to the N-acetylglucosamine on the nonreducing end side; claims 11 and 12 describe sugar-chain asparagines represented by the general formula (7) and a process for production thereof; and claims 13 and 14 describe inventions relating to products to which biotinylated sugar-chain asparagines set forth in claims 1 to 10 are bonded. The technical matter common to the inventions of the claims is a compound represented by the general formula (1) per se.

However, such compounds are known (see documents cited in this international search report, e.g. Shao, M.-C. Anal. Biochem., 1992, 205 (1), pages 77 to 82, and it is therefore not considered that the inventions contain one or more of the same or corresponding technical features.

Thus, this application includes the following two inventions which do not satisfy the requirement of unity of invention:

- a) Claims 1-4, 11 and 12 and parts of claims 13 and 14 referring to claims 1 to 4, and
- b) Claims 5-10 and parts of claims 13 and 14 referring to claims 5-10.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|---------------|-----|
| Novelty (N) | Claims | 2-4, 7, 8, 14 | YES |
| | Claims | 1, 5, 6, 9-13 | NO |
| Inventive step (IS) | Claims | | YES |
| | Claims | 1-14 | NO |
| Industrial applicability (IA) | Claims | 1-14 | YES |
| | Claims | | NO |

2. Citations and explanations

The opinion was formed based on the following documents cited in the international search report:

- Document 1: Shao, M.-C. Anal Biochem., 1992, 205 (1), pages 77 to 82
- Document 2: Fournet, B. et al., Eur. J. Biochem., 1987, 166 (2), pages 321 to 324
- Document 3: Shao, M.-C. et al., Biochemistry, 1989, 28 (9), pages 4077 to 4083
- Document 4: Shao, M.-C. et al., J. Biol. Chem., 1987, 262 (7), pages 2973 to 2979
- Document 5: Lin, C.-H. et al., Bioorg. Med. Chem., 1995, 3 (12), pages 1625 to 1630
- Document 6: Ichiro Chihata et al., edited by the Japanese Biochemical Society, "Affinitychromatography", Seikagaku Data Book II Compact Edition, Tokyo Kagaku Dojin, 1 October 1982 (2nd edition), pages 1196 to 1212
- Document 7: Leteux, C. et al., Glycobiology, 1998, 8 (3), pages 227 to 236
- Document 8: Poola, I. et al., Biochem. J., 1988, 250, pages 117 to 124
- Document 9: Yamamoto, K. et al., Biochemistry, 1981, 20, pages 5894 to 5899

- Document 10: Unverzagt, C., Carbohydrate Res., 1998, 305, pages 423 to 431
- Document 11: Haneda K. et al., Carbohydrate Res., 1996, 292, pages 61 to 70
- Document 12: Unverzagt, C., Tetrahedron Lett., 1997, 38 (32), pages 5627 to 5630
- Document 13: Seko., A. et al., Biochim. Biophys. Acta., 1997, 1335, pages 23 to 32
- Document 14: McGuire, J.M. et al., Carbohydrate Res., 1996, 292, pages 1 to 9
- Document 15: Meinjohanns, E. et al., J. Chem. Soc., Perkin Trans. 1., 1998, 1, pages 549 to 560
- Document 16: Pierce-Cretel, A. et al., Eur. J. Biochem., 1984, 139, pages 337 to 349
- Document 17: Chiesa, M.V. et al., Eur. J. Org. Chem., 2000, pages 3541 to 3554
- Document 18: Nomoto, H. et al., Carbohydrate Res., 1982, 107, pages 91 to 101
- Document 19: Brockhausen, I. et al., Biochem. Cell. Biol., 1988, 66, pages 1134 to 1151
- Document 20: JP 7-224082 A (Institute of Physical and Chemical Research)
- Document 21: Kornfeld, K. et al., J. Biol. Chem., 1981, 256 (13), pages 6633 to 6640

Claims 1, 5, 6 and 9 to 13

Document 1 (section relating to Materials and Methods, and fig. 1 and 2) sets forth the inventions disclosed in claims 1, 5, 6, 9 to 11 and 13 of this application, i.e. biotinylated sugar-chain asparagine derivatives, processes for the preparation thereof, and the use of said derivatives as microplates.

Document 2 (abstract and section relating to Experimental Procedures) sets forth the inventions disclosed in claims 1, 5, 6 and 12 of this application,

i.e. FITC-conjugated sugar-chain asparagine derivatives and processes for the preparation thereof.

Document 3 (abstract, section relating to Experimental Procedures; fig. 3) and document 4 (abstract; section relating to Materials and Methods and Results; fig. 1) set forth the invention disclosed in claims 1 and 11 of this application, i.e. biotinylated sugar-chain asparagine derivatives and processes for the preparation thereof.

Documents 5 and 7 to 21 set forth a large number of the sugar-chain asparagine derivatives and processes for the preparation thereof, together with specific substituents, useful as sugar-chains which are involved with intercellular recognition and interaction, similar to those set forth in documents 1 to 4, and it would not require particular creative skill on the part of a person skilled in the art to attempt to employ these chemical structures as an alternative to the chemical structures set forth in documents 1 to 4 in order to improve the efficiency of intercellular recognition and interaction and for research purposes.

Therefore the inventions set forth in claims 1, 5, 6, and 9 to 13 lack novelty and do not involve an inventive step in the light of documents 1 to 5 and 7 to 21.

Claims 2 to 4, 7 and 8

The inventions set forth in claims 2 to 4, 7 and 8, differ from the inventions set forth in documents 1 to 4 in the inclusion of (α 2, 3) or (α 2, 6) sugar-chain asparagine derivatives.

However, sugar-chain asparagine derivatives having (α 2, 3) or (α 2, 6) bonds are known as sugar-chains which are involved in intercellular recognition and interaction,

as set forth in document 5, therefore it would not require any particular skill on the part of a person skilled in the art to attempt to employ the invention set forth in document 5 as an alternative to the invention set forth in documents 1 to 4.

In addition, documents 7 to 21 set forth a large number of the sugar-chain asparagine derivatives and processes for the preparation thereof, together with specific substituents, useful as sugar-chains which are involved with intercellular recognition and interaction, similar to those set forth in documents 1 to 4, and it would not require particular creative skill on the part of a person skilled in the art to attempt to employ these chemical structures as an alternative to the chemical structures set forth in document 5 in order to improve the efficiency of intercellular recognition and interaction and for research purposes.

Therefore the inventions set forth in claims 2 to 4, 7 and 8 do not involve an inventive step in the light of documents 1 to 5 and 7 to 21.

Claim 14

The invention set forth in claim 14 differs from the inventions set forth in documents 1 to 5 and 7 to 21 in the bonding of a sugar-chain to an affinity column.

However, having a sugar chain serve as the adsorbent of an affinity column in order to separate lectin and the like is known, as set forth in document 6 (table 10.42), therefore it would not involve any particular creative skill on the part of a person skilled in the art to attempt to employ the sugar-chain asparagine derivatives set forth in documents 1 to 4 and 7 to 21 as the adsorbent of an affinity column.

Therefore the invention set forth in claim 14 does not involve an inventive step in the light of documents 1

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to 21.

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Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

| Application No. Patent No. | Publication date (day/month/year) | Filing date (day/month/year) | Priority date (valid claim) (day/month/year) |
|-------------------------------|--------------------------------------|---------------------------------|---|
| WO 03/008431 A1 [EY] | 30 January 2003 (30.01.2003) | 16 June 2002 (16.06.2002) | 19 June 2001 (19.06.2001) |

2. Non-written disclosures (Rule 70.9)

| Kind of non-written disclosure | Date of non-written disclosure (day/month/year) | Date of written disclosure referring to non-written disclosure (day/month/year) |
|--------------------------------|--|---|
| | | |

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VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 5, 13 and 14

Claim 5 sets forth an invention relating to sugar-chain asparagine derivatives, but with regard to the specific chemical structure, there is only reference to N-acetylglucosamine and fucose, and there is no delimitation with respect to the main sugar-chain structure, and even in light of the description, there is only the structure set forth in claims 6 to 10. Therefore, in the light of the claims and description, the inventions set forth in claim 5, apart from those with the structure set forth in claims 6 to 10, are not adequately disclosed, and not fully supported by the description, therefore the requirement of PCT Articles 5 and 6 are not met.

Therefore, when forming an opinion with respect to the invention set forth in claim 5, the chemical structure of the sugar-chain asparagine derivatives was delimited to those set forth in claims 6 to 10.

The same applies to the inventions set forth in claims 13 and 14, which refer back to claim 5.